

## CLAIMS

1. A process for upgrading a titaniferous material by removal of impurities which process includes the steps of:-

5 (i) heating a titaniferous material to a temperature of less than 1300°C to produce a solid titaniferous phase and a liquid oxide or glassy phase in the presence of sufficient of compounds which encourage the formation of the liquid oxide or glassy phase;

10 (ii) cooling the product of step (i) to form a solidified material comprising the titaniferous phase and an impurity bearing phase at a rate sufficient to ensure the susceptibility of the impurity bearing phase to leaching in either an acid or alkaline leachant; and

15 (iii) leaching the solidified material with an acidic or alkaline leachant to leach at least a portion of the impurities.

2. A process for upgrading a titaniferous material according to Claim 1 wherein the compounds which encourage the formation of the liquid oxide or glassy phase at a  
25 temperature below 1300°C are compounds of sodium, potassium, lithium, phosphorus silicon or boron.

3. A process for upgrading a titaniferous mineral according to Claim 2, wherein the compound of sodium is  
30 caustic soda.

4. A process for upgrading a titaniferous mineral according to Claim 2, wherein the compound of sodium is sodium carbonate.

5. A process for upgrading a titaniferous mineral according to Claim 2, wherein the compounds include borax.
- 5 6. A process for upgrading a titaniferous mineral according to Claim 2, wherein the compounds comprise a mixture of soda ash and borax.
- 10 7. A process according to Claim 6, wherein the titaniferous material is heated to a maximum temperature of 1000°C for a period which avoids substantial reduction to metal of contained iron oxides.
- 15 8. A process according to Claim 7, wherein the solidified material is leached with water.
- 20 9. A process according to Claim 7, wherein the solidified material is leached with a recycled solution of leach liquor containing sodium silicate and borax to form a leachate and a residue.
- 25 10. A process according to Claim 9, wherein the leachate is separated from the residue and the residue is leached with hydrochloric acid having an acid strength in a range from 1 to 20% hydrochloric acid.
- 30 11. A process according to claim 1 wherein the compounds include compounds which extend the effect of other compounds.
12. A process according to claim 11 wherein a compound which extends the effect of other compounds is borax.
13. A process according to claim 1 wherein sufficient compounds are present to avoid the formation of titanate

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phases that are not amenable to subsequent leaching.

14. A process according to claim 1 wherein the solidified material is leached under mild conditions.

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~~15. A process according to claim 14 wherein the solidified material is leached at atmospheric pressure.~~

10 16. An upgraded titaniferous material produced by the process of any one of claims 1 to 15.

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